

$$\textcircled{1} a_n = 8 + 4(n-1)$$

$$\textcircled{2} a_n = 10 - 3(n-1)$$

$$\textcircled{3} a_n = 3 \cdot 5^{(n-1)}$$

$$\textcircled{4} a_n = 360 \cdot \frac{1}{2}^{(n-1)}$$

$$a_n = \frac{360}{2^{(n-1)}}$$

$$\textcircled{5} a_n = 4 \cdot (-2)^{(n-1)}$$

$$\textcircled{6} a_n = 8 + \frac{2}{3}(n-1)$$

$$\textcircled{7} a_{20} = 84$$

$$\textcircled{8} a_9 = -14$$

$$\textcircled{9} a_{12} = 146, 484, 375$$

$$\textcircled{10} a_{11} = \frac{45}{128}$$

$$\textcircled{11} a_{15} = 65536$$

$$\textcircled{12} a_{17} = \frac{56}{3}$$

$$\textcircled{20} \sum_{i=1}^6 6 + 6(i-1)$$

$$\textcircled{23} \sum_{i=1}^8 2 \cdot 3^{(i-1)}$$

$$\textcircled{21} \sum_{i=1}^5 10 + 3(i-1)$$

$$\textcircled{22} \sum_{i=1}^6 64 \cdot \left(-\frac{1}{2}\right)^{(i-1)}$$

$\div -2$

$$\sum_{i=1}^6 \frac{64}{(-2)^{(i-1)}}$$

(24) $\sum_{i=1}^{35} i^2$ $\leftarrow n$

$$1 + 4 + 9 + 16 + 25 + \dots + 35^2$$

$$= \frac{n(n+1)(2n+1)}{6}$$

$$= \frac{35(36)(71)}{6}$$

$$= 14,910$$

25 $\sum_{i=4}^{10} (-2)^{i-1}$

geom.

$$= -8 + 16 + -32 + 64 + -128 + 256 + -512$$

$$= -344$$

$$\textcircled{26} \quad \sum_{i=1}^n 2 + 4(i-1)$$

$n \rightarrow 45$
 $a_1 + d(i-1)$
 $\downarrow \quad \downarrow$
 $2 + 4(i-1)$
 $i=1$

arith.

$$\text{Sum} = \frac{n(a_1 + a_n)}{2} = \frac{45(2 + a_{45})}{2}$$

$$a_{45} = 2 + 4(45 - 1)$$

$$a_{45} = 178$$

$$= \frac{45(2 + 178)}{2}$$

$$= \textcircled{4050}$$

(27) $\sum_{i=1}^n 10 \cdot \left(\frac{1}{4}\right)^{(i-1)}$
 (Annotations: $n \rightarrow 32$, $a_1 \cdot r^{(i-1)} \rightarrow 10 \cdot \left(\frac{1}{4}\right)^{(i-1)}$, $\underbrace{\hspace{1cm}}_{\text{eqn.}}$)

geom.

$$\begin{aligned}
 \text{Sum} &= a_1 \left(\frac{1-r^n}{1-r} \right) \\
 &= 10 \left(\frac{1 - \left(\frac{1}{4}\right)^{32}}{1 - \left(\frac{1}{4}\right)} \right)
 \end{aligned}$$

$n \rightarrow$
 (28)
 $\sum_{i=1}^{23}$
 $a_1 \cdot r^{(i-1)}$
 $4 \cdot 3^{(i-1)}$

geom.

$$\text{Sum} = a_1 \left(\frac{1 - r^n}{1 - r} \right)$$

$$= 4 \left(\frac{1 - 3^{23}}{1 - 3} \right) = 1.88 \times 10^{11}$$

~~1.88 E 11~~

$$\textcircled{29} \quad \sum_{i=1}^n 5 - 6(i-1)$$

$$\text{Sum} = \frac{40(5 - 229)}{2}$$

Annotations for the sum formula:

- $n \rightarrow 40$ (pointing to the upper limit of the sum)
- $i=1$ (pointing to the lower limit of the sum)
- a_1 (pointing to 5)
- a_{40} (pointing to 229)

$$a_{40} = 5 - 6(40 - 1)$$

$$= -4480$$

$$\textcircled{30} \sum_{i=5}^{16} n(n+2)$$

$$= 5(7) + 6(8) + 7(9) + 8(10) + \dots + 16(18)$$

$$\textcircled{= 1718}$$

③① $+7 \Rightarrow$ arith.

$$a_n = 8 + 7(n-1)$$

$$\sum_{i=1}^{20} 8 + 7(i-1)$$

$$\text{Sum} = \frac{n(a_1 + a_n)}{2}$$

$$= \frac{20(a_1 + a_{20})}{2} = \frac{20(8 + 141)}{2} = \boxed{1490}$$

$$a_{20} = 8 + 7(20-1)$$

$$a_{20} = 141$$

32 $\times 4 \rightarrow \text{geom.}$

$$a_n = 3 \cdot 4^{(n-1)}$$

$$\sum_{i=1}^{15} 3 \cdot 4^{(i-1)}$$

$$\text{Sum} = a_1 \left(\frac{1-r^n}{1-r} \right) = 3 \left(\frac{1-4^{15}}{1-4} \right) = 10,737,418.23$$

Applications

① 2, 5, 8,

pattern: +3

$$a_n = 2 + 3(n-1)$$

$$\sum_{i=1}^{20} 2 + 3(i-1)$$

$$\begin{aligned} a_{20} &= 2 + 3(20-1) \\ &= 59 \end{aligned}$$

$$\text{Sum} = \frac{n(a_1 + a_n)}{2}$$

$$= \frac{20(2 + 59)}{2} = \textcircled{610}$$

$$\textcircled{2} \quad 25,000 = a_1$$

$$\times 1.15$$

geom.

$$a_n = 25,000 \cdot 1.15^{(n-1)}$$

~~$$\sum_{i=1}^n$$~~

$$a_{10} = 25000 \cdot 1.15^{(10-1)}$$

$$= \$87,946.91$$

③ Sequence: (how much \$ she has):

0.1, 0.2, 0.3, 0.4, ...

$$a_n = 0.1 + 0.1(n-1)$$

$$\sum_{i=1}^{30} 0.1 + 0.1(i-1)$$

$$a_{30} = 0.1 + 0.1(30-1)$$

$$\text{Sum} = \frac{n(a_1 + a_n)}{2} = \frac{30(0.1 + 3)}{2} = \$46.50$$

$$\textcircled{4} \quad 350,000 = a_1$$

$$\times 1.05 = 1 + 0.05 =$$

geom.

$$a_n = 350,000 \times 1.05^{(n-1)}$$

$$a_{30} = 350,000 \times 1.05^{(30-1)}$$

$$a_{30} = \$1,440,647.46$$

$$\times 0.95$$

$$1 - 0.05 =$$

p. 663 #14

p. 664 #57

p. 672 #74-77